Melting the Mystery of the Great Ice Age

Research into glaciation began in the mid-19th century, but scientists are still uncertain about why ice ages occur or when the next glaciation period will emerge.

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Walls of Snow and Ice

Those of us who live in the Midwest United States seem to have the worst of both worlds: hot, humid summers where the temperature often reaches 95 degrees Fahrenheit, and cold winters where the mercury can plummet to zero. Despite these seemingly unbearable extremes, we live in a land of plenty because of the most fertile soil in the world—courtesy of the Great Ice Age.

According to scientists, over the course of the last two million years at least four (possibly six) periods of glaciation ploughed out an assortment of rock from Canada, moved it south in a 100-foot-high floe of ice and snow, pulverised it against bedrock and deposited it on the Midwest plain. The ice sheet produced large quantities of gravel, sand and silt. A mixture of these materials, called *till*, forms much of the soil in the Ohio and Upper Mississippi river valleys. Remnants of these vast sheets of ice can still be seen today in the form of numerous lakes that pepper the northern regions of the Midwest. Retreating glaciers left large depressions in the Earth's crust which filled with melt-water, the most magnificent of which are the Great Lakes. Other larger lakes, such as Winnipeg, Reindeer, Athabasca, Great Slave and Great Bear in Canada, existed at one time but have since drained off and disappeared.[1]

Glaciers reached as far south as the current locations of the Ohio and Missouri rivers, although the Wisconsin ice sheet, the most recent glacier, stopped midway across the extent of Illinois about 18,000 years ago and began to retreat some time between then and 16,000 years ago. Local legend has it that the glacier stopped 20 miles north of Springfield, the state capital. There is a grand mound there named Elkhart Hill, more than a mile in circumference. According to *History of Logan County, Illinois*, Elkhart Hill is "the most conspicuous physical feature that adorns the landscape of Logan County ... with virgin timber on its summit and every side, it entrances the vision of the passerby as it towers above" the surrounding landscape.[2]

Glacial advances and retreats also had dramatic effects upon areas south of the glaciers. An advance in the ice sheet in the northern hemisphere 30,000 years ago caused sea levels to fall approximately 425 feet. With so much water diverted from the natural cycle to form the ice, the flat continental shelves were exposed as dry land. This caused the same effect as raising the land, which caused rivers to erode deeply into the valleys—in the Lower Mississippi, Tombigbee-Alabama and Red river systems, for example. As the Wisconsin ice sheet began to melt, these valleys were filled with sediment carried by melt-water in swollen rivers. Most of the water south of the glaciers flowed into the Upper Mississippi, Ohio and Missouri river basins. Sediment-loaded water spilled into the Lower Mississippi River, forming a huge flood plain that stretched over 500 miles long and 200 miles wide.

At the leading edge of the glaciers, ice cliffs were up to 200 feet high, with cold dry winds sweeping down from their frozen crowns. The harshest of climatic conditions occurred in this zone next to the ice. Cold temperatures and strong winds created an Arctic-like desert, a wasteland littered with rock debris and fine sediment. Strong winds gathered this sediment from the glaciers and deposited it in sometimes thick, extensive layers called *loess*. These deposits cover much of the Midwest and extend south into Louisiana and Mississippi. Loess deposits form many of the present-day bluffs along the Lower Mississippi River and are the source of the Midwest's rich farmland that we enjoy today.

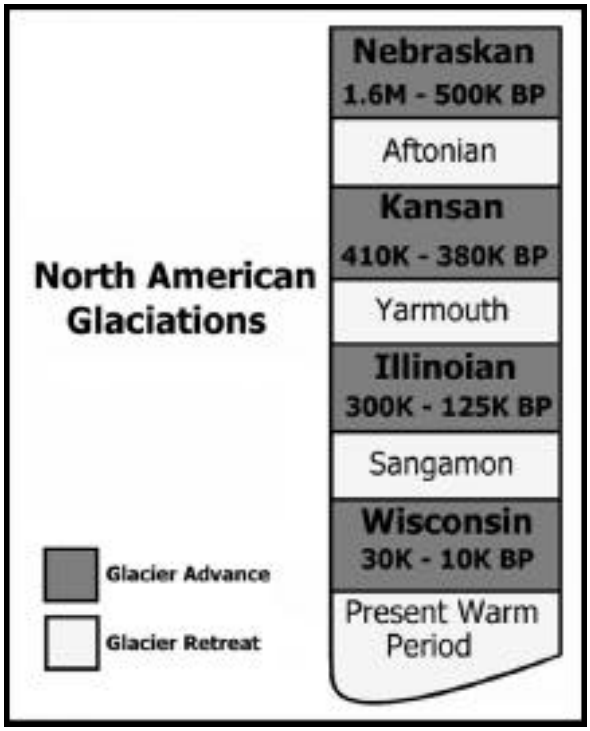
As the ice sheet slowly spread south over the North American continent, it pushed the sub-Arctic and temperate zones further south. Adjacent to the ice was a land of tundra, followed by a zone of shrub tundra, and then there were scrub birch forests, boreal forests (coniferous trees such as spruce, fir and pine) and finally, further south, deciduous forests.

Eighteen thousand years ago, when the last glaciers were at their maximum southern extent in North America, the Gulf Coast was also colder and drier. Annual rainfall in southern Louisiana and Mississippi was as much as 40 inches lower than it is today. Boreal forests extended as far south as northern Louisiana, Mississippi and Alabama. Sparse forests of northern pine likely covered the north central Gulf Coast. Oak and hickory forests grew in the river bottoms. Florida was drier and its average annual temperature was as much as 10°F cooler and was covered with sparse, scrubby vegetation, sand dunes and open grasslands. Tall grass prairie, with pine and aspen growing in the river bottoms, adorned central Texas. West Texas was likely a prairie covered with short grass.

James Croll concluded that the most plausible driving force behind climate change were variations in solar radiation striking the Earth.

It is a geologic fact that ice has had a great impact on North America, besides the geological evidence of moraines (mounds of glacial debris), kettle lakes, gouged bedrock and erratically placed boulders. Greenland and Antarctic ice core samples have demonstrated that levels of carbon dioxide (CO_2) have fluctuated over millions of years. Lower levels of CO_2 depict cooler periods in the Earth's history, but it is unclear whether these lower levels were the cause or the effect.

A great amount of scientific research has been applied to the study of ice and ice ages and much knowledge has been gained, but why the ice ages occurred is just as much a mystery now as it was when Joseph Adhémar published the first detailed ice age theory in his 1842 book *Révolutions de la mer: déluges périodiques* ("Revolutions of the sea: periodic floods").



Discovering the Great Ice Age

As early as 1787, Bernard Kuhn believed that erratically positioned boulders in the Swiss Jura were the result of ancient glaciation. After Scottish geologist James Hutton visited the Jura seven years later, he arrived at the same conclusion. However, until the first half of the 19th century, the prevailing model to explain the observable geologic evidence was that it was a result of the biblical Great Flood. German-born geologist Jean de Charpentier was captivated by these boulders and moraines, and during the 1830s he formed the first theory of glaciation. In 1841, his theory was published as *Essai sur les glaciers* ("Test on the glaciers"); it was the first detailed, scientific case for glaciation.

Louis Agassiz, who was also converted to the glacier explanation for these geologic curiosities, forged ahead and integrated all these geologic facts to formulate a theory that a Great Ice Age had once gripped the Earth. It was published in his 1840 book *Études sur les glaciers* ("Studies on the glaciers"). In *Système glaciaire* ("Glacial system"), published in 1847, he presented further evidence gathered from all over Europe that supported his theory. In 1846, Agassiz travelled to America, where he discovered even more evidence of glaciation. In 1848, he accepted a position at Harvard.

By 1870, the theory that there were ancient periods of extensive ice was generally accepted by the scientific community.

The Earth's Orbit and Wobble

With a scientific consensus that the Great Ice Age existed, the quest was on to find what caused it. The first theory, introduced by Joseph Adhémar, was based on the Earth's axis tilting back and forth over a 22,000-year period, commonly referred to as the precession of the equinoxes (25,800 years is considered the most accurate number today). As time passes, the constellations slowly change on a specific date (typically measured at the vernal equinox), moving backwards through the zodiac. Today, the Sun rises in the constellation of Pisces at the spring equinox. For 2,000 years before that, it rose in Aries. For the next two thousand years, beginning around 2070, it will rise in Aquarius.

This tilt of the Earth's axis is called the *plane of obliquity* and it extends outward to form a great circle in the celestial plane, known as the *ecliptic*. This angle is called the *obliquity of the ecliptic* and the present inclination is at 23.5 degrees to the vertical, but it varies from 24.5 to 22.1 degrees. As we know, this angle of the Earth's axis defines the seasons in temperate climates. According to Adhémar's theory, whichever hemisphere had a longer winter would experience an ice age. Thus, every 11,000 years an ice age would occur alternately in one hemisphere and then in the other.

James Croll, a self-taught scholar and one-time janitor at the Andersonian College and Museum in Scotland, objected to Adhémar's theory. He concluded that the most plausible driving force behind climate change were variations in solar radiation striking the Earth, called *insolation*, as a result of

the Earth's path of orbit, which is elliptical and can vary up to five per cent over time. This eccentricity affects the amount of solar radiation that strikes the Earth's surface at aphelion (our farthest point from the Sun) and at perihelion (our nearest point to the Sun).

According to Croll's theory, a decrease in the amount of solar radiation during the winter favours the accumulation of snow, but this will result in additional loss of heat by the reflection of sunlight back into space.

If winter occurs when the Earth is close to the Sun, temperatures will be naturally warmer than usual; but if winter occurs when the Sun is further away, temperatures will be colder than usual. Therefore, if the polar area of a hemisphere becomes colder, trade winds will be stronger in that hemisphere and warm equatorial ocean currents will shift towards the opposite hemisphere, further augmenting the heat loss. If the Earth's orbit were circular, the slow wobble would have no effect at all on climate. Each season would occur at the same distance from the Sun. However, since insolation in the northern hemisphere is out of phase with that of the southern hemisphere, Croll believed that the ice ages would alternate from the northern to the southern hemisphere.

Although the alternating ice ages theory was proved to be wrong, Croll's ideas laid the foundation for ice age causality. He was the first to recognise the importance of ocean currents, solar radiation and the eccentricity of the Earth's orbit in building an explanatory model. In 1876, Croll was named a Fellow of the Royal Society of London.

Early in the 20th century Milutin Milankovitch, a professor of physics, mathematics and astronomy at the University of Belgrade, revived Croll's insolation theory and set out on the task of detailing insolation based on Ludwig Pilgrim's latest calculations of the Earth's orbit.

He showed that the insolation was dominated by a 23,000-year cycle and concluded that ice ages would be most intense when the solar radiation dropped below a certain threshold. Since the insolation curve has an approximate 100,000-year cycle, he believed that such a cycle might be seen in the ice ages. He also had the insight to put forward the idea that the northern hemisphere would dominate because it contained two-thirds of the Earth's land mass. Driven by the amount of solar radiation in the north, the ice ages in both the hemispheres would be synchronised.

Milankovitch's insolation theory was abandoned when age estimates, made possible by radiocarbon dating, showed that the timing of his ice ages calculations was incorrect. However, isotope studies in sea-floor sediments during the 1960s and 1970s, which focused on changes in the Earth's climate, revived his theory.

Deep-sea sediments containing the shells of small plankton-like organisms, called *foraminifers*, hold a history of climate change.

When alive, these organisms fix themselves to two types of oxygen atoms: the abundant and more common oxygen-16 isotope, and oxygen-18. Oxygen-18, the heavier isotope, is enriched in ocean water; the lighter atom is found in higher concentrations in snow and ice. Whenever water is extracted from the ocean to make more ice, the calling card is left in the oxygen. This enrichment, from oxygen-16 to oxygen-18, is seen in the carbonate shells of the foraminifers (made of $CaCO_3$). The carbonate precipitates from sea water, so the oxygen that builds the carbonate crystals reflects the composition of the sea water.

By analysing oxygen isotopes in foraminifers, scientists can determine when the Earth produced more glaciers and the time periods when ice ages occurred. In sea-floor sediments, evidence for 100,000-year as well as 41,000-year and 23,000-year cycles in climate has been discovered. But there are still unresolved questions.

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In glacial data, the 100,000-year cycle seems to dominate, with the 41,000-year cycle weaker and the 23,000-year weakest of all. However, in insolation theory, it is the reverse: the 23,000-year cycle dominates and the weakest appears to be the 100,000-year cycle.[3]

Himalayan Uplift and the Global Climate

One of the more recent theories to explain ice ages links changes in global climate to one of the Earth's most impressive geological features: the Himalayas. According to the theory proposed in 1988 by Maureen Raymo, an Earth sciences research professor at Boston University, as the Himalayas grew, a massive amount of rock was exposed to the elements. Monsoon rains soaked the land, and the face of the exposed rock eroded.

This process of chemical weathering extracted so much carbon dioxide from the atmosphere that global temperatures dropped, thus triggering an ice age.[4] To show that this was the case, Raymo turned to the study of sea-floor sediments and strontium.

There are several types (isotopes) of strontium, each with a different atomic mass. Strontium-87, a heavier variety, is washed into the sea by the chemical weathering of rock. The lighter variety, strontium-86, is released by the spreading seafloor and comes from deep inside the Earth. By comparing the amounts of the isotopes in different layers, Raymo believed that she would learn which process was more active at any point in time. Thirty-five million years ago, strontium-87 increased dramatically, coinciding with the Himalayan uplift.

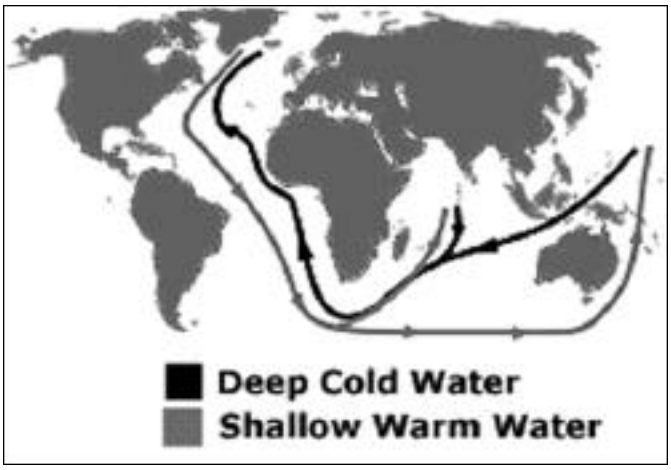
With the strontium evidence, Maureen Raymo thinks she has solved the ice ages mystery. First, the uplift of the Tibetan region intensified the Indian monsoon. Then the monsoon rains eroded the mountains, stripping carbon dioxide from the air. Finally, with less carbon dioxide, the atmosphere gradually cooled.

Ocean Currents and a New Ice Age

Although distinct ocean currents have been known about for some time, scientists have recently determined that ocean currents play a crucial role in climate and weather. New research has shown that shallow, warm-water currents from the Pacific flow westwards, around Africa, and then northwards along the African and European coasts.[5] The flow of these waters keeps Europe balmy in contrast to its counterpart, Labrador, across the Atlantic. It provides Western Europe with a third as much warmth as the Sun does, and is part of a global oceanic system that maintains the climatic *status quo*.

Donald Patten proposes a completely different theory as to the cause of the ice age—one that involves a catastrophe of global proportions.

In the North Atlantic, the Gulf Stream carries heat in the form of warm water to the north and east. And as it moves north, it evaporates and transfers its heat to the coastal areas. The warm water becomes saltier with evaporation, and when it reaches the latitude of Iceland its density reaches a point that it sinks to the bottom. Then it becomes part of the cold-water return cycle and flows southwards in the Atlantic towards Antarctica, around Africa and back to the Pacific via Australia. If by some way the warm waters ceased, Europe would enter a mini ice age. Recent studies suggest that this is a possibility and that the present conveyor belt in the North Atlantic is unpredictable.[6] Since the end of the last ice age, the Arctic icecap has continued to melt, allowing fresh water into the North Atlantic. If too much fresh water enters the ocean (thereby diluting its salt content and keeping it less dense), it will not sink and join the return currents at the bottom; it will remain where it is, blocking the warm currents from entering and thus altering the climate of Europe.



The cold, salty water that flows from the South Atlantic and eastwards near the Antarctic coast sinks into the depths, thereby boosting its push to the interconnected system of ocean currents. According to Wallace Broecker of Columbia University, New York, Antarctic surface waters are sinking at only a third of the rate they were a hundred years ago. If this is correct, the slowdown in the Antarctic deep current will make the Antarctic region colder and the Gulf Stream warmer. The present global warming trend began during the 1880s and received a boost during the 1970s from man. Broecker believes that this warming is man-made and is fighting against a natural cooling trend.[7]

The Visiting Comet

Donald Patten proposes a completely different theory as to the cause of the ice age—one that involves a catastrophe of global proportions. Although his idea seems to be as much theologically driven as scientific, he puts forth a well-researched and plausible explanation of the effects that a comet "near miss" would have on the Earth's climate.[8] He also discusses motives and beliefs—almost a creationist's rebuttal to geologic uniformitarianism—and provides a history of scientists and writers espousing a catastrophic approach to Earth geology. Since the 1920s, George McCready Price, Byron C. Nelson, Alfred M. Rehwinkel, Henry Morris, Charles Hapgood, Ivan T. Sanderson, Immanuel Velikovsky and Dolph E. Hooker, among others, have carried the banner of a sudden catastrophic approach to explaining ice ages.

The phenomenon that provides Patten and others with some punch to their proposition is the bizarre evidence of the frozen mammoths, which is still a mystery today. Although mammoths are not the sole animals that have been found frozen (rhinoceroses, sheep, horses, oxen, lions, tigers and bison have also been found), as an extinct species they have been at the forefront of scientific research. Their remains, sometimes whole, have been found in Siberia and Alaska by the tens of thousands and have provided the world with an ongoing supply of ivory.

Russia has a 2,000-year-old tradition of providing ivory from Siberian islands. Between 1880 and 1900, nearly 20,000 tusks were taken from a single island. It is estimated that there may be up to three million mammoths still buried in Siberia.[9] According to a *National Geographic* article, experts estimate that there are 600,000 tons of ivory still available for recovery.[10] A sudden calamity, such as an asteroid impact or a comet near miss, fares well in explaining the deaths of millions of animals. Its precedent is seen in the greatest extinction of all at the end of the Cretaceous period, when a giant asteroid impact resulted in the extinction of dinosaurs.

In his comet near-miss theory, Patten also explains the formation of mountain ranges and why they are distributed in an arc across the continents. When this icy visitor came too close to Earth, it became trapped in orbit for a period of nine months, circling as another moon. On two occasions when it came quite close, its gravitational pull exerted extreme force not only on the oceans, creating giant tidal waves, but also on the Earth's molten core. Magma in the core reacted in much the same way as the oceans do to a gravitational force. As a result, with each close pass of the comet, a wave of molten rock was pulled upwards, forcing the Earth's crust upwards.

As this comet danced in Earth's orbit, ice that had broken away from its mass was deposited in vast quantities through electromagnetic deflection. [Note: the "dirty snowball"

theory is being challenged by the plasma comet theory. Ed.] According to Patten's theory, six million cubic miles of ice was dumped on the northern and southern hemispheres each—ice with a temperature of –150°F. At the centre nodes, the ice would have been three miles thick and feathering out at the edges. The ice appeared suddenly, not over a long period of time. Only this, according to the theory, accounts for the sudden freezing of millions of animals.

Patten also argues that the shape of the ice sheets fits the comet near-miss theory. The continent-sized glaciers of the last glacial period were thickest at the centre. From today's climate in Antarctica, we know that very little snow falls at the centre of the continent due to the cold dry air's inability to retain moisture. It is a desert wasteland of rock and gravel. On the edges, however, there is substantial snowfall because of the convergence of warm, moist air with cold air. If snow were to be the primary factor in creating the ice of the ice age, then its accumulation would be thicker at the periphery and not at the centre.

The Wandering Poles

One of the most intriguing human elements of the wandering pole theory of history professor Charles Hapgood is that Albert Einstein believed researching the subject was desirable and that it "would not be justified to discard the idea *a priori* as adventurous".[11] Einstein's letter to Charles Hapgood, dated November 24, 1952, is published in Hapgood's book *The Path of the Pole*:

"I frequently receive communications from people who wish to consult me concerning their unpublished ideas. It goes without saying that these ideas are very seldom possessed of scientific validity. The very first communication, however, that I received from Mr. Hapgood electrified me. His idea is original, of great simplicity, and—if it continues to prove itself—of great importance to everything that is related to the history of the earth's surface."[12]

Geologic evidence suggesting that the poles may have been in different positions during the Pleistocene is impressive.

Hapgood began his research into the wandering poles as a result of his interest in geography and ancient maps, which led to his re-discovery of the Piri Reis map, a hand-drawn Turkish naval map that had been gathering dust since the 16th century. According to its sources, the map was drawn a few years after Columbus launched his first voyage to the Americas. Admiral Piri Reis, the map's cartographer, noted that his world map was derived from very old reference maps. Upon close inspection, Hapgood noticed evidence of spherical trigonometry in the map's layout and a detailed knowledge of global geography that included the coastline of Antarctica at some remote time when it was free of ice. The map was accurate at a time when no one should have known the coastal areas of Antarctica. This prompted Hapgood to search for an explanation that eventually led to his controversial theory.

According to Hapgood's theory of wandering poles, every 20,000 to 30,000 years the Earth's continental plates move rapidly as a single unit over great distances. This phenomenon, known as continental drift, occurs today but at a much slower rate. His theory stipulates that if conditions arise that create an imbalance in the Earth's gyroscopic rotation, the Earth's plates will move in such a manner as to return the Earth to a balanced spin.[13]

Geologic evidence suggesting that the poles may have been in different positions during the Pleistocene is impressive. Using geomagnetic and carbon dating evidence, Hapgood identifies the locations of four previous poles and maps out their transitional paths. By around 11,600 years ago, towards the end of the Pleistocene, the North Pole moved to its current position in the Arctic Ocean; by 50,000 years ago it was in Hudson Bay; by 75,000 years ago it was in the Greenland Sea; and by 120,000 years ago the pole was in the Yukon Territory of Canada.[14]

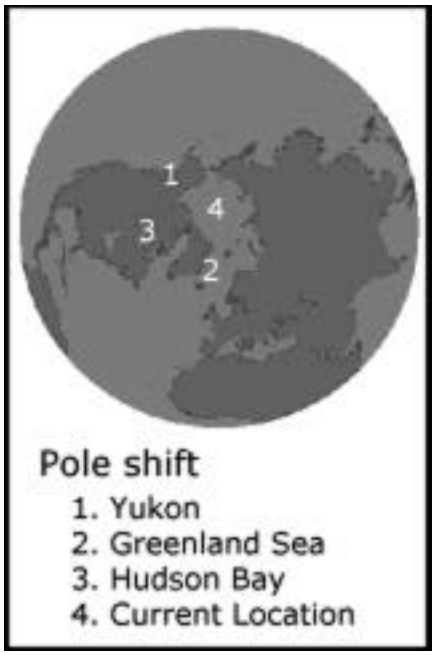
How this movement can occur is easily explained by the Earth's composition. We live on the crust, the outer surface, which is comprised of six main continental plates and a few smaller ones. The inner core consists of solid iron, which is surrounded by an outer core of liquid iron. Surrounding the core is the mantle, composed of molten rock (lower mantle) and solid rock (upper mantle). The upper mantle and crust are loosely connected and able to slide against each other, the least effect of which is continental drift. Theoretically, each layer is capable of movement independent of other layers. According to Hapgood, the top two layers can slide, if certain forces are applied, while the core, axis and orbit of the planet remain unchanged. The difficult part is: what force causes the slippage?

In Hapgood's opinion, the centrifugal momentum of icecaps, eccentric to the poles, provides this force. The weight of the ice on the poles creates an imbalance in the Earth's rotation. Eventually this builds to a point where a change is required to correct the imbalance. Hapgood realised that the entire planet did not need to be repositioned around its axis to maintain its balance. Only the outer crust needed to move, just as the loose skin of a peeled orange can slide around the inner fruit. He envisioned a catastrophic and dramatic move of the entire crust that allowed the polar ice caps to melt in a new, warmer climate. Ice would then begin to build at the new poles, awaiting the next shift. The crust's rapid movement, of course, would create environmental mayhem. If the current level of seismic and volcanic activity were a result of plates shifting between one and four centimetres per year, a much faster rate of change would likely be apocalyptic.

Whatever way the poles shifted, regional climates everywhere would change dramatically. The displaced polar ice would melt, causing incredible floods. The new polar areas would freeze in a relatively short amount of time, almost instantly killing life that was accustomed to a warmer climate. Areas of climatic convergence would shift; deserts

would receive rain while rainforests would become deserts. Plant and animal life would need to adapt to the new conditions or become extinct. The evidence suggests as much.

Frozen deposits of soil, rock, plant and animal remains, commonly known as *muck*, exist in Alaska. Professor Frank Hibben of the University of New Mexico explains: "In many places, Alaskan muck is packed with animal bones and debris in trainload lots. Bones of mammoths, mastodons, several kind of bison, horses, wolves, bears and lions tell a story of a faunal population … within this frozen mass lie the twisted parts of animals and trees intermingled with lenses of ice and layers of peat and mosses. It looks as though in the midst of some cataclysmic catastrophe of ten thousand years ago the whole Alaskan world of living animals and plants was suddenly frozen in mid-motion like a grim charade … twisted and torn trees are piled in splintered masses … at least four considerable layers of volcanic ash may be traced in these deposits, although they are extremely warped and distorted."[15]



In southern California's La Brea tar pits, more than 565 species of animals were fossilised in the sticky tar (asphalt) some 10,000 years ago. During the first excavation in 1906, scientists found a bone bed that contained over 700 sabre-toothed tiger skulls. Combined with wolf skulls, they averaged 20 per cubic yard.[16] There existed more bones than tar and were discovered "broken, mashed, contorted and mixed in a most heterogeneous mass",[17] nearly identical to the muck of Alaska. One hundred thousand fossilised birds were also recovered representing over 138 species, 19 of which are extinct.

During the same period of time, mammoths were being killed in a similar fashion. John Massey Stewart, writing in the *Smithsonian*, estimated that more than 500,000 tons of mammoth tusks were buried along Siberia's Arctic coastline.[18] Several dozen frozen mammoth carcasses have been found with the flesh still intact, such as the Jarkov mammoth.[19] They died suddenly, and found in their stomachs was undigested plant matter that included grass, bluebells, wild beans and buttercups. Scientists have concluded that some of the mammoths died of asphyxiation, but in general the cause of death has not been determined.

A shift of the North Pole from Hudson Bay to its current position in the Arctic Ocean would explain the mysterious extinctions and mass burials that occurred at the end of the Pleistocene. During the time of the Hudson Bay pole, the northern Siberian coastline would have had the same latitude as Japan does today, far outside the Arctic Circle. But when the poles shifted, the climate would have rapidly changed within a matter of days from a summer savannah where mammoths grazed to a frozen wasteland. In his theory, Hapgood also explains the mountain-building forces as a function of gravity. Although the forces that build a mountain are obviously complex, the principles are simple to explain. As an area of land moves towards the pole, because the radii and circumference of the Earth become shorter there is less surface area in which to move. (The Arctic Circle and equatorial circumferences differ by 13 miles.)

A surplus of surface exists, and this, being pulled down by gravity, must fold. Mountains are not being pushed up, but the surface is being pulled down nearer to the Earth's core. The force of gravity over a large area folds the surface in a small area to accommodate its new position on the globe. In the opposite direction, as land moves away from the pole, it must expand. Major parallel faults will occur with minor faults at right angles. Where these faults occur, molten rock from below fills up the crevasse. According to Hapgood, the movements of land to and away from the equator over millions of years have produced the mountain ranges we admire today.[20]

The Galactic Superwave

Still another, more recent, theory explains that the global warming at the end of the last ice age was a result of a cosmic phenomenon known as a *galactic superwave*, proposed by physicist Dr Paul LaViolette. According to LaViolette, every 13,000 to 26,000 years the galaxy's core (the bulge where there exists an immense number of stars) emits intense cosmic radiation.[21] This radiation, composed of high-energy electrons and electromagnetic radiation (from radio waves to X-rays and gamma rays), sails out from the core of the galaxy in a "superwave" travelling near the speed of light. When the superwave finally reaches our solar system, some 28,000 light years from the galactic core, it alters the behaviour of the Sun.

Our solar system is shrouded in cosmic dust and debris, known as the Oort cloud. According to LaViolette's theory, when the superwave passes through this cloud it brings with it a large amount of dust, and when the dust reaches the Sun it serves as fuel for the Sun's furnace. As a result, solar flare activity increases and the Sun's corona and photosphere increase in size—with drastic climatic effects for Earth. The increased solar activity would cause a sudden period of warming for the Earth's climate. Furthermore, cosmic particles that entered the Earth's atmosphere would be captured by the Earth's magnetic field and form radiation belts in the upper atmosphere. In a single day, the energy injected into the Earth's atmosphere would be equivalent to a billion-ton hydrogen bomb. These climatic effects would last for several thousand years.

According to LaViolette, such a superwave was responsible for the drastic climatic changes our planet experienced between 15,300 and 14,150 years ago[22] that ultimately ended the ice age and caused the extinction of numerous species. He also believes that the evidence suggests that two particularly intense solar flares occurred about 12,840 years ago and 12,730 years ago,[23] producing large coronal mass ejections that overtook the Earth. LaViolette believes that the sudden super-warming was responsible for initiating rapid glacial melting and continental flooding.

A Permanent Ice Age or No Ice Age At All?

The various hypotheses explaining the Great Ice Age appear as a grab-bag of theoretical "pick and choose". Each is backed by scientific evidence and has its own aficionados. Each tells a story of the Earth's past and all fall into one of two general categories: those who postulate slow, gradual, climatic change, and those who describe a sudden catastrophic beginning to the ice age. However, Hapgood in his pole shift theory implies that the ice age never existed. But that is a matter of perception, geographically speaking, as there is always an existing ice age near the poles. North America was located close to the Arctic Circle and was naturally covered in ice because of its position, as were the various poles before it (and as is our current north pole). With the exception of mountain formation, the mechanics of pole shift are essentially the same as slow continental drift, only it occurs during a much smaller period of time. This, of course, has made Hapgood's theory controversial.

Regardless of whether the ice age was a natural phenomenon or the result of an interstellar visitor, the climate drastically altered life for those that were alive. It is a known geologic fact that at the end of the last ice age, c. 10,000 BC, many North American species became extinct, including the mammoth, camel, horse, ground sloth, peccary (a pig-like hoofed mammal), antelope, American elephant, rhinoceros, giant armadillo, tapir, sabre-toothed tiger and giant bison. Whatever caused the ice ages, it also affected the climates of lower latitudes in Central and South America. Those lands also have revealed evidence of mass extinctions. The mechanism that brought these animals to their graves is still a mystery. ∞

About the Author:

Edward F. Malkowski is the author of *Sons of God – Daughters of Men* (Bits of Sunshine Publishing Co., 2003), *Before the Pharaohs* (Bear & Co., 2006; reviewed in NEXUS 13/06) and *The Spiritual Technology of Ancient Egypt* (to be published by Bear & Co. in November 2007). He is currently working on a new book with Christopher Dunn, author of *The Giza Power Plant* (Bear & Co., 1998; reviewed in NEXUS 13/06). He works as a software developer and historical researcher in Champaign, Illinois, USA. He can be contacted via his website, http://www.sonsofgod-daughtersofmen.com/.

This article was first published as "The Ice Age: One of History's Biggest Mysteries" at the author's webpage http://www.sonsofgod-daughtersofmen.com/iceage.htm.

Endnotes

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